

YELLOW WARBLER (*Dendroica petechia*)

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Criteria Scores

Dendroica petechia

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
15	15	2.5	0	2.5	0	5

Dendroica petechia sonorana

Population Trend	Range Trend	Population Size	Range Size	Endemism	Population Concentration	Threats
20	20	10	10	0	10	0

Special Concern Priority

Dendroica petechia. Currently considered a Bird Species of Special Concern (breeding), Priority 2. Included on both previous lists (Remsen 1978, CDFG 1992).

Dendroica petechia sonorana. Currently considered a Bird Species of Special Concern (breeding), Priority 1. No subspecies were included on the original list (Remsen 1978), and this subspecies was not included on CDFG's (1992) list.

Breeding Bird Survey Statistics for California

1966-1999					1966-1979			1980-1999			Credibility
Trend	P	n	(95% CI)	R.A.	Trend	P	n	Trend	P	n	
-2.2	0.07	117	-4.6, 0.2	1.19	-4.4	0.13	75	-3.0	0.05	100	high

General Range and Abundance

D. petechia is comprised of three subspecies groups: *aestiva* (continental North America), *petechia* (Caribbean and extreme southern Florida), and *erithachorides* (coastal Mexico and northern South America). The *aestiva* group breeds widely across Alaska, Canada, northern two thirds of United States, northern Baja and interior Mexico and patchily across southwest United States (Lowther et al. 1999). Migrates broadly across North America, to winter in southern Baja, along coasts and

interior southern Mexico, Middle and South America and rarely but regularly in coastal and eastern southern California (Dunn and Garrett 1997, Howell and Webb 1995, Lowther et al. 1999). Four subspecies of the *aestiva* group occur in California: breeding *D. p. brewsteri*, *D. p. morcomi* and *D. p. sonorana*, and transient *D. p. rubiginosa* (Browning 1994, Dunn and Garrett 1997).

D. p. morcomi breeds from a sliver of southern Alaska through southwest Yukon Territories, interior to southern British Columbia and interior western United States, including eastern California, to northern Arizona and New Mexico. *D.p. brewsteri* breeds from coastal Washington and Oregon, through California west of the Cascades and Sierra Nevada (Browning 1994).

D. p. sonorana. Breeds along lower Colorado River and from southern Arizona and southwest New Mexico to north central Mexico and probably the Colorado River Delta (Browning 1994, McKernan and Braden 2001, O. Hinojosa pers. comm.).

Seasonal Status in California

D. petechia occurs as migrant and summer resident throughout the state from late March through early October; and rarely but regularly as winter resident along south coast and in Mojave and Colorado Desert regions (Rosenberg et al. 1991, Dunn and Garret 1997, T. & J. Heindell pers. comm.). Coastal breeding populations arrive late March/early April (southern) and mid April (northern) (Dunn and Garrett 1997). Eastern California breeding populations begin to establish territories by early May, lay first eggs in third week of May and fledge last young in third week of July (Heath et al. 2001, PRBO unpubl. data). *D. p. sonorana* arrive to breed on Lower Colorado River in early April (Rosenberg et al. 1991).

Historical Range and Abundance in California

D. petechia. Grinnell and Miller (1944) described *D. p. brewsteri* as a “common” and “locally abundant” breeder throughout entire northern California and west of the Sierra Nevada divide below 7,000 ft (2134 m) in elevation, including lower mountains and coastal slopes of southern California to sea level. *D. p. morcomi* bred “commonly”, integrating with *D.p. brewsteri* at the headwaters of

the Owens River, Mono County and extending south along eastern slope of Sierra Nevada through the Owens Valley to Owens Lake, ranging in altitude from 3600 ft (1097 m) to 8500 ft (2591 m), and also in the White, Panamint and Grapevine Mountains, Inyo County. Generally present throughout these regions among riparian plant associations composed of willows (*salix* spp.) cottonwoods (*Populus* spp.), aspens (*Populus tremuloides*), sycamores (*Platanus racemosa*) and alders (*Alnus* spp.) Grinnell and Miller 1944).

Historic locations of confirmed breeding for *D.p. brewsteri* include Crescent City, Del Norte County; Twelve-mile Creek, Modoc County; Secret Valley and Bogard Ranger Station, Lassen County; Lyman's, Mineral and Battle Creek Meadows, Tehama County; Independence Lake, Nevada County; Lake Tahoe, El Dorado County; Sacramento, Sacramento County; Palo Alto, Santa Clara County; Delhi, Merced County; San Joaquin River, Madera County; Mono Lake, Mono County, Onyx and Camp Nelson, Kern County; Compton, Los Angeles County; Oro Grande, San Bernardino County; Cabezón, Riverside County; and Vallecito, San Diego County. Confirmed historic breeding locations for *D.p. morcomi* include Benton, Mammoth Creek, and Convict Creek, Mono County; Laws, Silver Canyon, Big Pine, Independence, Lone Pine, and Panamint and Grapevine mountains, Inyo County (Grinnell et al. 1930, Grinnell and Miller 1944, SBMNH and WFVZ egg set data).

Few quantitative estimates of historic abundance exist. Further, abundance records for regions such as the Sacramento River (e.g. 10 individuals/3 river mi (4.8 km), 6 individuals/1.5 river mi (2.4 km), and 8 territorial males/10 acres (4 ha), Grinnell et al. 1930) are complicated by the lack of discernment between singing migrants and breeders, as both likely occurred during the late May surveys (T. Minolis pers. comm.). It is likely that the shifting floodplain of an unencumbered Sacramento River provided early successional riparian vegetation that yellow warblers favor, suggesting that the species did indeed breed along the Sacramento River. Their historic abundance in this region, however, remains unclear.

D. p. sonora. “Abundant” breeder along entire California reach of the Colorado River valley below 600 ft (183 m) (Grinnell and Miller 1944), where an estimated one to four males occurred in every 0.99 acres (0.40 ha) of willow and cottonwood habitat in 1914 (summarized by Rosenberg et al. 1991).

Recent Range and Abundance in California

D. petechia. An area of confirmed non-breeding encompasses the San Joaquin and lower Sacramento River valleys and forms an internal aperture in the otherwise unchanged outline of the historic breeding range. Extensive surveys in the summers of 1998 and 1999 failed to locate breeding yellow warblers in remaining riparian habitat along the main stem or lower tributaries of the San Joaquin or Sacramento Rivers in Kings, Fresno, Madera, Merced, Stanislaus, San Joaquin, Sacramento, Yolo, Sutter, or Colusa counties (Ballard et al. 1999, PRBO unpubl. data). Confirmed breeding records are few, despite intensive coverage, further north along the Sacramento River in Glenn and Tehama Counties where 5 nests for 3 breeding pairs were found in 1999 (Small et al. 2000, PRBO unpubl. data).

Locations of confirmed breeding are more numerous throughout higher elevation Tehama, Butte, Plumas, Shasta and Siskiyou Counties (Alexander 1999, King et al. 2001, PRBO unpubl. data, KBO unpubl. data, SFSU unpubl. data, CPIF 2001). At Gurnsey Creek, Tehama County, yellow warbler abundance was 0.97 territories/ha in 1998 and 0.83 territories/ha in 1999 (King et al. 2001), and in xeric montane shrub fields of Lassen National Forest, yellow warblers were the 3rd most abundant species (Burnett and Geupel 2001). Shasta County abundance estimates include: 0.26 territories/ha at Clear Creek (DeStaeble and Burnett 2002) and between 0.04 and 1.14 individuals detected/ha among 8 Sacramento River locations (Nur et al. 1997).

Eastern Sierra Nevada populations are possibly the most abundant in the state. In Mono County: lower Rush Creek harbored 2.33 territories/ha in 2000; lower Lee Vining Creek had 1.46 territories/ha in 2000; and Convict, McGee and Green creeks also supported abundant populations

(range: 0.92 – 1.59 individuals detected/ha). Inyo County breeding populations above 7545 ft (2300 m) include: North Lake (0.55 territories/ha) and Buttermilk Country (1.07 individuals detected/ha). Lower elevation Owens Valley populations are few and less abundant: Owens River sites had 0.39 and 0.08 individuals detected/ha and 0.11 individuals/ha were detected at lower Hogback Creek. Owens River alluvial fan sites harbored 0.39 territories/ha in 1998, but no territories were established in 1999 or 2000 (Heath et al. 2001).

Yellow warbler breeding populations are sparse among central coast and delta counties of Marin, Alameda, San Mateo, Santa Cruz, Monterey and San Luis Obispo, and some atlas authors suggest probable but unquantified historical declines (Shufford 1993, Roberson and Tenney 1993, Alameda, San Mateo, San Luis Obispo atlases and PRBO unpubl. data). Sonoma County populations breed locally throughout and appear “relatively common” (Burridge 1995). Abundance estimates are few: among several intensively surveyed Marin County riparian locations, few to no individuals were detected during the breeding season and only one nest was found (Holmes et al. 1999, Small and Geupel 1999, Gardali et al. 1999, Meyer et al. 2001, PRBO unpubl. data). Monterey County abundance was an estimated 500-900 pairs (Roberson and Tenney 1993).

Confirmed breeding sites are numerous in the southern coastal mountains of Santa Barbara, Ventura, Los Angeles and San Bernardino counties (USFS and Los Angeles atlas unpubl. data, CPIF 2001). Coastal and inland populations of Santa Barbara and San Diego Counties are abundant (Gallo et al. 2000, Unitt pers. comm., UCSB unpubl. data). Three riparian drainages on Vandenberg Airforce Base had 1.31, 0.84 and 0.69 individuals detected/ha (Gallo et al. 2000). Yellow warblers have probably benefited over the last ten years from restoration and management efforts targeted for least Bell’s vireo (*Vireo bellii pusillus*) recovery in these counties (P. Unitt pers. comm.).

Locations of confirmed breeding for regions with relatively sparse coverage include Sub-headquarters, Modoc County; White’s Bar, Trinity County; Taylor Meadow, Nevada County; Big

Meadow, Mariposa County; and Zumwaldt Meadow, Fresno County (IBP unpubl. data, CPIF 2000). 142 males were counted during 10 July 1999 counts at the Kern River Preserve, Kern County – far exceeding the estimated 14 pairs for the entire valley in 1985 (B. Barnes pers. comm., S. Laymon pers. comm.). Yellow warblers have probably benefited from restoration and management efforts targeted for willow flycatcher (*Empidonax traillii*) recovery in the valley (S. Laymon pers. comm.).

D. p. sonora. By 1955, the yellow warbler had disappeared from historic breeding sites along the lower Colorado River (Rosenberg et al. 1991) and the population was considered “extirpated” by the early 1960’s (Garrett and Dunn 1997). In the late 1970s and early 1980s, singing males were reported at several locations along the California section of the river, and one female was observed feeding a juvenile in 1986 near Blythe (Garrett and Dunn 1981, Rosenberg et al. 1991). 1996-2000 confirmed nesting localities along several California sections of the river, coupled with high relative abundance of the species in those areas, suggest that Sonoran yellow warblers are either recovering, or remnant populations were overlooked throughout the period of reported extirpation (McKernan and Braden 2001, B. McKernan pers. comm.).

Ecological Requirements

D. petechia. Yellow warblers display an overall affinity for riparian vegetation in close proximity to water (Lowther et al. 1999), although some California populations have been documented in xeric montane shrub fields far from the water’s edge (Grinnell et al. 1930, Gaines 1992, Burnett and Geupel 2001). Some coastal California populations appear to have an aversion to damp and foggy coastal drainages (Roberson and Tenney 1993).

Studies from several California locations demonstrated the importance of willow cover as nesting substrate and as a predictor of high yellow warbler abundance (King et al. 2001, Nur et al. 1996, Alexander 1999, PRBO unpubl. data), as have studies outside of California (Knopf and Sedgwick 1992). Locations of highest California yellow warbler densities are those that provide

early successional wet willow shrub fields, interspersed with grasses (Heath et al. 2001). Additionally, yellow warbler abundance was positively influenced by Oregon ash (*Fraxinus latifolia*) trees, and white alder (*A. rhombifolia*) and valley oak (*Quercus lobata*) trees and blackberry (*Rubus* spp.) shrubs, and were chosen as nesting substrate in Shasta County (Nur et al. 1996, Wood et al. 2001). Several atlas authors describe yellow warbler breeding habitat as well developed riparian corridors with willow and several tree species including cottonwoods, sycamores, California bay (*Umbellularia californica*), big-leaf maple (*Acer macrophyllum*) or white alder (Roberson and Tenney 1993, Lehman 1994, Burridge 1995).

The yellow warbler exhibits an overall high degree of foraging elasticity, suggesting adaptability to variation in local vegetation structure (Petit et al. 1990). In the lowland riparian woodland of Dog Island, Tehama County, yellow warblers foraged primarily within 2-5 m (6.6–16.4 ft) understory vegetation (Laymon 1981). The diet of yellow warblers in California contained over 97% animal matter including ants, bees, wasps, caterpillars, beetles, true bugs, flies, and spiders (Beal 1907).

Yellow warblers have shown a high degree of site fidelity with 60-64.5% males and 32-44% females returning to their previous year's breeding grounds, a high percentage of which returned to the same territory (Studd and Robertson 1989, Knopf and Sedgwick 1992). They also have been shown to quickly respond to changes in habitat management such as riparian-grazing cattle removal (Taylor and Littlefield 1986, Krueper et al. *in prep.*). In California, they will make several nesting attempts, but generally only produce one brood per year (PRBO unpubl. data).

Reported nest success among California populations range from below standard at Mono County sites (Heath et al. 2001), to average at Shasta County sites (Wood et al. 2001), to extremely high at Tehama County sites (King et al. 2001). Limiting factors at these sites included nest depredation by mammalian, reptilian or avian predators, and parasitism by the brown-headed cowbird (*Molothrus ater*). At Mono County sites, predation accounted for 86% of all yellow

warbler nest failure (PRBO unpubl. data). Sixty percent of all nests were parasitized, of which: 31% fledged yellow warbler young and 44% failed due to predation (Heath et al. 2001). Parasitism was absent at the Tehama County sites, where nest success was extremely high (King et al. 2001). Yellow warblers have demonstrated cowbird egg burying behavior in California (PRBO unpubl. data).

D. p. sonorana. The Sonoran yellow warbler was formerly a characteristic breeder in the willows and cottonwoods that lined the Colorado River (Rosenberg et al. 1991). Nests are currently found in decadent willow stands and revegetated cottonwoods at Lake Havasu, Arizona (Lynn and Averill 1996) and over 75% of 100+ nests found downstream of Davis Dam on the Lower Colorado River were located in saltcedar (*Tamarix* spp., B. McKernan pers. comm.).

Threats

D. petechia. The identification of the causes behind yellow warbler population declines in California has been largely anecdotal, with the loss of riparian habitat and brown-headed cowbird parasitism as the most commonly reported threats. Indeed, it is likely that loss of early successional wet willow habitat along the Sacramento and San Joaquin rivers have impacted the yellow warbler, while in other regions, the problem may lie with the loss of more structurally diverse riparian systems. It appears that locally, some yellow warbler populations have increased over the last ten years as a combined result of habitat restoration and cowbird control (P. Unitt pers. comm., S. Laymon pers. comm.). Interestingly, Mono County sites that are currently undergoing restoration have the highest reported yellow warbler densities in the state (Heath et al. 2001), as are sites that have remained relatively protected (Gallo et al. 2000).

Single year results from California study areas suggest that indeed, parasitism rates are high in locations with low nest success (Heath et al. 2001), and absent in locations with high nest success (King et al. 2001). Additionally, high brown-headed cowbird abundance in riparian breeding areas was best predicted by the abundance of one of its locally most common hosts, the yellow warbler

(Heath et al. 2001). Predation, however, accounts for the majority of nest loss in both parasitized and unparasitized nests, and yellow warblers young manage to fledge from 1/3rd of parasitized nests (Heath et al. 2001). High predation rates, combined with the ability of yellow warblers to recognize adult cowbirds, raise both cowbirds and their own young, and at times bury cowbird eggs, suggests that even where parasitism rates are high, there may be other limiting factors at play. This interplay between parasitism and predation, combined with landscape level influences on predator and brown-headed cowbird abundance, has been reported for Montana yellow warbler populations as well (Tewksbury et al. 1998). There is also debate as to whether parasitism increases or decreases the likelihood of predation (McLaren and Sealy 2000).

D. p. sonorana. Rosenberg et al. (1991) suggested that the combined forces of major loss of suitable habitat (willow-cottonwood) first, then breeding failure in replacement habitats (screwbean mesquite (*Prosopis pubescens*) and saltcedar), and finally cowbird pressure in remaining stands of suitable habitats were responsible for the near extirpation of the Sonoran yellow warbler along the lower Colorado River.

Management and Research Recommendations

D. petechia.

- protect and create dynamic riparian systems that provide the mechanisms (e.g. seasonal flooding) to create early successional as well as more structurally complex vegetative components.
- focus management and restoration efforts primarily on identifying and maintaining source populations capable of producing young in excess of adult mortality.
- initiate studies on the ecology of nest predators and parasitism within various habitat types to make clear the most effective management options for increasing reproductive output.
- eliminate or manage brown-headed cowbird feeding sites near yellow warbler breeding habitat.

- Brown-headed cowbird trapping programs should consider guidelines addressed in Smith (1999) and by the North American Cowbird Advisory Council (NACAC 2001).

D. p. sonorana

- initiate studies on the effects of saltcedar, nest predators and parasitism to elucidate the most effective management options for increasing reproductive output.
- California efforts should be coordinated with those in Arizona, Nevada and the Colorado River Delta, Mexico.

Monitoring Needs

D. petechia. Yellow warblers have been shown to quickly respond to changes in management and habitats and may act as an easily monitored indicator of the success of rehabilitation efforts in their beginning stages (Taylor and Littlefield 1986, Laymon pers. com., Rosenberg et al. 1991, Krueper et al. in prep). Although yellow warblers are well sampled by the Breeding Bird Survey, the methodology may be inadequate for monitoring changes in breeding population trends. One-time BBS surveys do not sufficiently distinguish between migrant and breeding individuals.

Additionally, survey routes are along roadways and therefore do not suffice in tracking local population changes as a direct result of management. Statewide BBS routes should be complemented by off-road standardized point counts and accompanying habitat assessments (Ralph et al. 1993), specifically targeted at reference, and restoration or managed sites throughout California. In either case, surveys should be complemented by the concurrent documentation of breeding behavior.

Standardized nest monitoring programs (e.g. Martin et al. 1997) should be established at reference sites with high yellow warbler abundance, among all of California's general bioregions. Yellow warbler nests are easy to locate and monitor, though little California specific nest data exists. Predation and parasitism are primary threats for this species, and only nest monitoring, with an emphasis on nest predator and parasitism identification, will allow these threats to be fully

addressed. Nest monitoring should be accompanied by nest site habitat assessments that will allow for the identification of habitat features that may ease predation or parasitism pressures. If brown-headed cowbird control measures are deemed necessary, such measures should always be preceded by baseline and accompanied by concurrent nest monitoring studies. Landscape-scale investigations and management of brown-headed cowbird feeding locations should accompany such studies.

D. p. sonora. In conjunction with existing work (e.g. McKernan and Braden 2001), an initial one to two year rapid assessment (e.g. Ballard et al. 1999), of all suitable habitats along the lower Colorado River should be initiated to locate yellow warbler breeding populations. Existing specialized monitoring programs for federally listed species (e.g. those oriented toward willow flycatchers) should be maximized by collecting standardized data on multiple species, including the yellow warbler (e.g. point counts, Ralph et al. 1993). Nest monitoring should be conducted at sites with high yellow warbler abundance, to determine parasitism and predation rates and habitat features that may influence nest success. Monitoring results should be provided to existing coordinated restoration efforts (e.g. LCRMSCP 2001).

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